JASON Final Report

January 1995

JSR-94-105

JASON
The MITRE Corporation
7525 Colshire Drive
McLean, Virginia 22102-3481
(703) 883-6997

1.9 Hydrotesting

- **Study Leader**: Doug Eardley
- **Study Sponsor**: DOE
- **Report**: JSR-94-340 (U)

As part of the JASON study on Stewardship of nuclear weapons, a separate examination of the question of the utility, and need for, hydronuclear testing was undertaken. A *hydrotest* is an explosively driven implosion of simulated components of a nuclear primary, but without achieving criticality for nuclear chain reactions. A *hydronuclear* test is also an explosively driven implosion, with fissionable special nuclear materials now involved, such as plutonium or U^{235}, and a critical mass is achieved but with limited nuclear yield. In other words, it amounts to a carefully controlled fizzle of a real nuclear weapon through deliberate design or modification of a real weapon. Hydro, or hydronuclear, tests address the primary component of nuclear weapons. As with all activities concerning nuclear weapons, the current purpose of these tests is to assure the safety, reliability and performance in the stewardship of the US stockpile of nuclear weapons. The primary of a nuclear weapon functions through the sudden assembly of a critical mass of fissionable material by means of high explosive. In most modern weapons explosively driven hydrodynamic implosion is used. The purpose of hydrotests is to study this hydrodynamic implosion in detail. Hydro*nuclear* tests furthermore study the beginnings of the nuclear chain reaction in the implosively assembled primary. An important question, and the one examined in the JASON study, is the relative importance of hydro vice hydro*nuclear* testing in assuring the safety, reliability and performance of nuclear weapons in an era of a comprehensive test ban.